We claim:

1. An optical device comprising:

an input fiber for inputting an input optical signal;

an output fiber for outputting an output optical signal;

an optical path between said input fiber and said output fiber;

a substrate comprising at least one step with predefined parameters, said at least one step being disposed in part of said optical path and adding a phase shift to light passing therethrough; and

a variable phase shifting element controlled by an applied signal, disposed serially with said at least one step in said part of said optical path;

such that the optical interference between light traversing that part of said optical path containing said at least one step and light traversing those parts of said optical path not containing said at least one step results in a wavelength dependent transmission through said device.

2. An optical device according to claim 1 and wherein the phase shift in said part of said optical path containing said at least one step is selected such that the said device has a predetermined spectral transmission profile.

3. An optical device according to claim 2, wherein said variable phase shifting element is pixelated such that it shifts the phase of light passing through at least part of said part of said optical path.

4. An optical device according to claim 2, wherein said variable phase shifting element is a liquid crystal device.

5. An optical device according to claim 2, wherein said input fiber and said output fiber are disposed such that light passes from said input fiber to said output fiber by transmission through said optical path.

6. An optical device according to claim 2, and also comprising a reflecting

surface associated with said substrate, and wherein said input fiber and said output fiber are disposed such that light undergoes reflection between them.

7. An optical device according to claim 2, and also comprising a circulator and a reflecting surface, and wherein said input fiber and said output fiber are connected to two ports of said circulator, and said substrate and associated reflecting surface are disposed at a third port of said circulator.

8. An optical device according to claim 2, and operative as a gain equalizer.

9. An optical device according to claim 2, and wherein said parameters are at least one of the optical cross section and the height of said at least one step.

10. An optical device according to claim 2, and wherein said applied signal is adjusted according to the spectral profile of said output optical signal, such that said optical device modifies the spectral transmission profile of said optical path dynamically.

11. An optical device according to claim 10, and also comprising a channel monitor monitoring said output signal, and wherein said applied signal is obtained from said channel monitor.

12. An optical device according to claim 10, and wherein said optical device compensates for changes in the spectral profile of said input signal dynamically.

13. An optical device according to claim 10, and wherein said applied signal is dependent on the effective wavelength and amplitude of those of the Fourier components of the spectral profile of said output optical signal, which are associated with said at least one stepped area of said substrate.

14. A method of adjusting the spectral transmission profile of an optical path,

comprising the steps of:

providing an input fiber for inputting an input signal to said path;

providing an output fiber for outputting an output signal from said path;

disposing a substrate having at least one stepped area with predefined parameters in said optical path;

disposing a variable phase shifting element controlled by an applied signal, serially with said at least one stepped area in said optical path; and

adjusting said applied signal such that the optical interference between light traversing said at least one stepped area and light traversing those parts of said optical path not containing said at least one stepped area produces the desired spectral transmission profile of said optical path.

15. A method according to claim 14, and wherein said parameters are at least one of the optical cross section and the height of said at least one stepped area.

16. A method according to claim 14, and wherein said variable phase shifting element is pixelated such that it shifts the phase of light passing through at least part of said at least one stepped area.

17. A method according to claim 14, wherein said controllable phase shifting element is a liquid crystal device.

18. A method according to claim 14, wherein said input fiber and said output fibers are disposed such that light passes from said input fiber to said output fiber by transmission through said optical path.

19. A method according to claim 14, and also comprising the additional step of providing a reflecting surface associated with said substrate, and disposing said input fiber and said output fibers such that light undergoes reflection between them.

20. A method according to claim 14, and also comprising the additional steps of providing a circulator and a reflecting surface, and connecting said input fiber and said output fiber to two ports of said circulator, and said substrate and associated reflecting surface to a third port of said circulator.

21. A method according to claim 14, and wherein said applied signal is adjusted according to the spectral profile of said output optical signal, such that said optical device modifies the spectral transmission profile of said optical path dynamically.

22. A method according to claim 21 and also comprising the step of channel monitoring said output signal, and wherein said applied signal is derived from said channel monitoring.

23. A method according to claim 21, and wherein said step of adjusting said applied signal compensates for changes in the spectral profile of said input signal dynamically.

24. A method according to claim 21, and also comprising the step of determining the Fourier components of the spectral profile of said output optical signal, and wherein said applied signal is adjusted according to the effective wavelength and amplitude of those of the Fourier components of the spectral profile of said output optical signal, which are associated with said at least one stepped area of said substrate.

25. A method of changing the spectral profile of an input optical signal to a predetermined profile, comprising the steps of:

determining the effective wavelengths and amplitudes of a predetermined number of Fourier components of the spectral profile of said input optical signal;

determining the effective wavelengths and amplitudes of said predetermined number of equivalent Fourier components of said predetermined spectral profile;

calculating a transfer function according to the ratio of each of said predetermined number of Fourier components of the spectral profile of said input optical signal to each of said predetermined number of Fourier components of said predetermined profile;

providing a substrate having a plurality of stepped areas, one stepped area for each determined Fourier component; and

passing said input optical signal through said substrate;

wherein the height of each of said stepped areas is predetermined according to the wavelength of said transfer function associated with its stepped area, and the area of each of said stepped areas is predetermined according to the amplitude of said transfer function associated with its stepped area.

26. The method of claim 25 and also comprising the step of providing a variable phase shifter disposed across the cross section of at least one of said stepped areas, and wherein adjustment of said phase shifter varies the wavelength of that component of said transfer function associated with said stepped area.

27. The method of claim 25 and wherein said variable phase shifter is pixelated, and wherein the generation of differential phase shifts by said pixels varies the amplitude of that component of said transfer function associated with said stepped area.